REMARKS

Claim 1 has been amended to include the word "all", and thereby clarify that a determination of idle times existing is made after completion of all regularly scheduled transmissions within the communication channel. Claim 16 has been amended to clarify clients sharing the idle time unused within a frame after the completion of all regularly scheduled transmissions within the frame.

New claims 19-29 have been added. It is respectfully submitted that no new matter has been added.
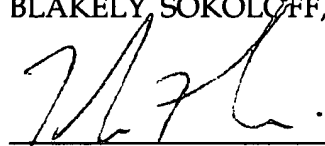
Various typographical errors, which appeared in the Specification, have been corrected.

If there are any additional charges not covered by any check submitted, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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VERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Paragraph beginning at line 24, page 8 has been amended as follows:

The use of the slotted link communication architecture described above can present challenges for accommodating asynchronous data transmissions within a subnet 10. For example, consider a file transfer process between a network master (e.g., server 12) and a client 16 that takes place in an operating environment under the control of the Windows™ operating system (or one of its variants) produced by Microsoft corporation of Redmond, Washington. In such a transfer, the requesting entity (i.e., the network resource, say a personal computer, requesting the transfer of data) initiates the transfer by sending a Server Message Block (SMB) protocol command to open the file on the target platform (e.g., a server or another personal computer storing the requested material). The target [devie] device responds with another SMB command and supplies the requesting device with a pointer to the requested file. The requesting device, using this pointer, then reads a block of N-bytes from the designated file, specifying the block size using an offset from the pointer provided by the target device. In response, the target device reads N-bytes worth of data from the subject file and delivers this information to a transmission control protocol/internet protocol (TCP/IP) (assuming this is the transfer protocol being used) layer that handles communication between the devices. The TCP/IP layer fragments the N-bytes of data into smaller TCP/IP packets and begins transmitting the packets to the requesting device across the communication channel. As the requesting device receives the packets, it transmits acknowledgements back to the target device. After the last packet for the N-byte transfer has been received and acknowledged, the requesting device transmits another SMB request for the next block of M-bytes from the subject file. M and N may be the same or different, and this process continues until the file transfer is complete.

Paragraph beginning at line 3, page 13 has been amended as follows:

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Described herein is a scheme for avoiding latencies in asynchronous communications [with an wireless] within a wireless communication channel of a computer network. The present scheme is generally applicable to a variety of network environments, but finds especially useful application in a wireless computer network which is located in a home environment. Thus, the present scheme will be discussed with reference to the particular aspects of a home environment. However, this discussion should in no way be seen to limit the applicability or use of the present invention in and to other network environments and the broader spirit and scope of the present invention is recited in the claims which follow this discussion.

Paragraph beginning at line 5, page 14 has been amended as follows:

As explained in greater detail in the above-cited co-pending application, when a client device 16 [join] joins a subnet, the client receives a Connection Agreements (CAG) package from the network master device (e.g., server 12). This package includes, among other things, information regarding the forward and backward bandwidth (e.g., the slots of the channel) to which the new client 16 is entitled. In addition, the maximum number of bytes the new client 16 can send/expect in each data packet is set for each type of packet (e.g., video data, audio data, etc.). The Connection Agreements package may also contain information regarding the total number of data frames that the new client 16 needs to wait (i.e., before transmitting its traffic) from the start of server's transmission and the identification of the preceding client (i.e., the client that owns the preceding reverse transmission slot). The client is also assigned a unique session identifier (CS-ID).

Paragraph beginning at line 7, page 16 has been amended as follows:

In conjunction with the use of an AST 54, a client 16 may also incorporate an early trigger timer (ETT) 55 to ensure that packets are ready for transmission within the subnet when the client's transmission slot arrives. That is, an ETT 55 may be used to advance the internal construction of a packet or packets for transmission, with the goal being to have those packets assembled and ready for transmission when the client's transmission slot

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becomes available. Thus the ETT 55 (which may be implemented as a conventional timer) triggers the process of formation of packets and their error protection bits, etc., using a packet construction engine 56 (which in some cases may be a part of client 16 or in other cases may be a part of radio 14) to keep a few packets, at least, prepared before the actual start of transmission. For example, in one embodiment packets could be assembled and stored for transmission one network frame in advance of their actual transmission. Such preassembly is helpful in avoiding the idle times on the channel when the first few packets for a transmission sequence are being formed. Although collecting data for one network frame in advance of transmission may penalize the system with a one network frame latency at the first transmission slot, it is expected that this period can be reduced to a few milliseconds.

Paragraph beginning at line 5, page 17 has been amended as follows:

Each client device may program an associated CCA timer 57 (see [Figure 4] Figure 3) to a predetermined value. The network master may specify this value at the time a master-client connection is established and it generally represents a period of time that must expire before a network client is permitted to assume that another client is not using the channel. Now, suppose a client device is 5th in line for transmission after the master device and suppose it detects a clear channel (e.g., because its CCA timer 57 times out) after the device that is second in line has completed its transmission. Because the device is 5th in line, it cannot immediately begin its own transmissions (after all, there are still two client devices in line ahead of it). However, the 5th device may increment an associated CCA counter 58 at this time. If then both the 3rd and 4th devices are silent (i.e., if the 5th device's CCA timer 57 times out two more times in succession), then the 5th device will have again twice incremented its CCA counter 58 and may immediately start its own transmission on the 3rd CCA detection.

Paragraph beginning at line 1, page 19 has been amended as follows:

In order to provide a somewhat fair allocation scheme, in one embodiment each client is permitted to transmit only one packet in the idle time at the end of a network frame 52. This allows the devices in subnet 10 to take turns transmitting asynchronous (e.g., low priority) data over the channel. This protocol may be abandoned and a transmission commenced if a packet from a previous client is detected in the idle time and there is sufficient time in the idle period for a packet transmission. However, before any transmission in the idle time occurs, a device wishing to send data should allow sufficient time for the Q slot before the commencement of the next network frame.

Paragraph beginning at line 19, page 19 has been amended as follows:

If a device wishes to transmit multiple packets within the idle time of a single network frame, a two-step process may be invoked. First, the device transmits an initial packet in its regular space in the idle time, determined according to the above protocol. Then, the device may reprogram its T_{idle} time such that $T_{idle} = T_{CCA} * N$, where N is the total number of devices (including the master) in the subnet 10. The next idle time transmission for the subject device can [than] then occur at this new T_{idle} time, provided sufficient time remains before the Q slot. If a packet from another device is received before this new T_{idle} time expires, the CCA may be reprogrammed to the time between the device's transmission and the reception of the newly received packet. This helps assure an equal opportunity for all devices in the subnet 10 to use the idle time for transmission of asynchronous data.

Paragraph beginning at lines 10 and 12, page 20 has been amended as follows:

Packet size will play a role in determining how [may] many devices are afforded the opportunity to transmit within an idle time. That is, even if a device's time for transmission in an idle time has arrived, that device should not transmit [it it] if it detects an ongoing transmission of another device. Also, devices sending smaller packets during an idle time may be benefited to a lesser extent than those transmitting larger packets, as a

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device is only (usually) able to transmit one packet per idle time. To balance this equation, and reduce the potential for collisions within an idle time, one embodiment of the present scheme restricts devices to a predetermined time duration for any such transmissions. In other words, only packets up to a predetermined size are eligible for transmission in an idle time.

IN THE CLAIMS

6.   (Amended) A method, comprising maintaining a clear channel assessment that takes into account a first device's designated transmission time slot within a communication channel with respect to those of other network devices in order to determine idle times that exist after completion of all regularly scheduled transmissions within the communication channel.

16.   (Amended) A method comprising accommodating asynchronous data transmissions within a synchronized network, in which inter-node communications are organized into frames of time periods, by permitting such asynchronous communications within otherwise idle times within [the frames] those frames having unused idle times that occur upon completion of all regularly scheduled transmissions within such frames.

17.   (Amended) The method of claim 16 wherein use of the [otherwise] idle times [within the frames] takes into account a transmitting node's designated transmission time within a particular frame with respect to transmission times of other nodes of the network.

19.   (New) A method, comprising:

allocating, for each of a number of clients of a computer network, a designated transmission time slot within each network frame period of a communication channel of the computer network;

establishing a common clear channel waiting time to be used by each of the clients of the computer network;

upon detecting an idle time at an end of a network frame period, those of the clients of the computer network having data to transmit sharing the idle time for transmissions of data according to a sharing plan that takes into account the common clear channel waiting time.

20.   (New) The method of claim 19, wherein the sharing plan comprises those of the clients of the computer network having data to transmit each waiting a time $T_{idle} = T_{CCA} * C$ before transmitting a packet within the idle time, where T_{CCA} is the common clear channel waiting time, and C is a difference between a client's designated transmission time slot and a transmission time slot of a last client to transmit within the channel.

21.   (New) The method of claim 19 wherein those of the clients of the computer network having data to transmit, transmit only one packet in the idle time.

22.   (New) The method of claim 19 wherein those of the clients of the computer network having data to transmit take turns transmitting asynchronous data over the channel in the idle time.

23.   (New) The method of claim 22, wherein those of the clients of the computer network having data to transmit take turns by each computing a waiting time $T_{idle}=T_{CCA} * C$ before transmitting a packet within the idle time, where T_{CCA} is the common clear channel waiting time, and C is a difference between a client's designated transmission time slot and a transmission time slot of a last client to transmit within the channel; and then transmitting only a single packet.

24.   (New) The method of claim 19, wherein those of the clients of the computer network having data to transmit take turns transmitting low priority data over the channel in the idle time.

25.   (New) The method of claim 24, wherein those of the clients of the computer network having data to transmit take turns by each computing a waiting time $T_{idle}=T_{CCA} * C$ before transmitting a packet within the idle time, where T_{CCA} is the common clear channel waiting time, and C is a difference between a client's designated transmission time slot and a transmission time slot of a last client to transmit within the channel; and then transmitting only a single packet.

26.   (New) The method of claim 19, wherein the sharing plan further takes into account each respective client's designated transmission time slot within network frame periods.

27.   (New) The method of claim 26, further comprising one of the clients of the computer network requesting a new designated transmission time slot earlier in each network frame period that a current designated transmission time slot of that client in order to have a better chance of making use of the idle time.

28.   (New) The method of claim 19, further comprising a first one of the clients of the computer network transmitting a packet in the idle time after waiting a time $T_{idle}=T_{CCA} * C$, where T_{CCA} is the common clear channel waiting time, and C is a difference between the first client's designated transmission time slot and a transmission time slot of a last client to transmit within the channel.

29.   (New) The method of claim 28, further comprising the first client reprogramming its T_{idle} as $T_{idle}=T_{CCA} *N$, where N is the total number of devices in the computer network.